

**WHAT IS CLAIMED IS:**

1. A system for modifying an image having pixels, comprising:  
means for automatically identifying a main subject of the image,  
and  
means for altering pixel values to emphasize said main subject.
2. The system of Claim 1 wherein said means for altering  
emphasizes said main subject by altering pixel values that are a part of said main  
subject.
3. The system of Claim 1 wherein said means for altering  
emphasizes said main subject by altering pixel values that are not a part of said  
main subject.
4. The system of Claim 4 wherein said means for identifying  
further comprises:  
means for segmenting the image into a plurality of regions based  
on uniform image characteristics;  
means for calculating a level of saliency for said plurality of  
regions, and  
means for assigning a believe value to the pixels corresponding to said level of  
saliency.
5. The system of Claim 4 wherein said image characteristic is pixel  
color.
6. The system of Claim 4 wherein said image characteristic is  
texture.

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7. The system of Claim 4 wherein said means for calculating calculates said level of saliency as proportional to a region feature.

8. The system of Claim 4 wherein said means for calculating calculates said level of saliency as proportional to a combination of region features.

9. The system of Claim 4 wherein said means for calculating calculates said level of saliency as proportional to a structural region feature.

10. The system of Claim 4 wherein said means for calculating calculates said level of saliency as proportional to a semantic region feature.

11. The system of Claim 4 wherein said means for segmenting orders said belief values according to a probability that a region is a main subject.

12. A system of modifying an image having pixels, comprising:  
means for automatically generating at least a first belief value associated with one of a plurality of regions of the image, said belief values related to the probability that the associated region is a main subject of the image and

means for altering pixel values in said plurality of regions in relation to said associated belief values.

13. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main subject regions and background regions, and wherein  
said means for altering further comprises a means for desaturating the pixels in said background regions.

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means for replacing the color values of the pixels in said background regions with their respective luminance values.

means for computing a saturation value for each pixel, and  
means for altering the pixel saturation values according to said  
associated belief values.

16. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said means for altering further comprises a means for enhancing  
saturation of the pixels in said main subject regions.

17. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said means for altering further comprises:  
means for computing a saturation value for each pixel in said  
background regions, and  
means for altering the pixel saturation values in said background  
regions according to said associated belief values.

18. The system of/Claim 12 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering means further comprises:

means for computing a saturation value for each pixel in said main subject regions, and

means for altering the pixel saturation values in said main subject regions according to said associated belief values.

19. The system of Claim 12 wherein said means for altering further comprises:

means for computing a luminance value for each pixel, and

means for altering the pixel luminance values according to said associated belief values.

20. The system of Claim 12 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said means for altering further comprises means for altering the pixel luminance values in said main subject regions according to said associated belief values.

21. The system of Claim 12 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said means for altering further comprises means for altering the pixel luminance values in said main subject regions according to said associated belief values.

22. The system of Claim 12 wherein said means for altering further comprises:

means for computing a hue value for each pixel, and  
means for altering the pixel hue values according to said associated

23. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main

24. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main

25. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main

26. The system of Claim 12 further comprising:  
means for determining a threshold belief value discriminating main

31. The system in Claim 30 wherein said means for desaturating further comprises:

means for replacing the color values of the pixels in said background regions with their respective luminance values.

means for computing a saturation value for each pixel, and  
means for altering the pixel saturation values according to said  
associated belief values.

34. The system of Claim 29 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said means for altering further comprises:  
means for computing a saturation value for each pixel in said  
background regions, and  
means for altering the pixel saturation values in said background  
regions according to said associated belief values.

35. The system of Claim 29 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said altering means further comprises:

means for computing a saturation value for each pixel in said main subject regions, and

means for altering the pixel saturation values in said main subject regions according to said associated belief values.

36. The system of Claim 29 wherein said means for altering further comprises:

means for computing a luminance value for each pixel, and

means for altering the pixel luminance values according to said associated belief values.

37. The system of Claim 29 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said means for altering further comprises means for altering the pixel luminance values in said main subject regions according to said associated belief values.

38. The system of Claim 29 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said means for altering further comprises means for altering the pixel luminance values in said main subject regions according to said associated belief values.

39. The system of Claim 29 wherein said means for altering further comprises:

means for computing a hue value for each pixel, and

means for altering the pixel hue values according to said associated belief values.



41. The system of Claim 29 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said means for altering further comprises means for altering the  
pixel hue values in said main subject regions according to said associated belief  
values.

43. The system of Claim 29 further comprising:  
means for determining a threshold belief value discriminating main  
subject regions and background regions, and wherein  
said means for altering further comprises means for of inverting the  
pixel hue values in said background regions.

44. The system of Claim 29 wherein said means for altering further comprises:  
means for computing a blur value for each pixel, and

means for altering the pixel blur values according to said associated belief values.

45. The system of Claim 20 further comprising:

means for determining a threshold belief value discriminating main subject regions and background regions, and wherein

said means for altering further comprises means for calculating a pixel blur value for each pixel, and means for altering the pixel blur values in said background regions according to said associated belief values.

46. A method of modifying an image having pixels, comprising the steps of:

automatically identifying a main subject of the image, and altering pixel values to emphasize said main subject.

47. The method of Claim 46 wherein said main subject is emphasized by altering pixel values that are a part of said main subject.

48. The method of Claim 46 wherein said main subject is emphasized by altering pixel values that are not a part of said main subject.

49. The method of Claim 46 wherein said identifying step comprises the steps of:

segmenting the image into a plurality of regions based on uniform image characteristics;

calculating a level of saliency for said plurality of regions, and

assigning a belief value to the pixels corresponding to said level of saliency.

50. The method of Claim 49 wherein said image characteristic is pixel color.

51. The method of Claim 49 wherein said image characteristic is texture.

52. The method of Claim 49 wherein said level of saliency is calculated as proportional to a region feature.

53. The method of Claim 49 wherein said level of saliency is calculated as proportional to a combination of region features.

54. The method of Claim 49 wherein said level of saliency is calculated as proportional to a structural region feature.

55. The method of Claim 49 wherein said level of saliency is calculated as proportional to a semantic region feature.

56. The method of Claim 49 wherein said belief values are ordered according to a probability that a region is a main subject.

57. A method of modifying an image having pixels, comprising the steps of:

automatically generating at least a first belief value associated with one of a plurality of regions of the image, said belief values related to the probability that the associated region is a main subject of the image;

altering pixel values in said plurality of regions in relation to said associated belief values.

58. The method of Claim 57 further comprising the steps of:

said altering step comprises the step of desaturating the pixels in said background regions.

calculating the luminance values for the pixels in said background regions;

60. The method of Claim 57 wherein said altering step comprises steps of:

61. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
background regions, and wherein

62. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
background regions, and wherein

said altering step comprises the steps of:  
 computing a saturation value for each pixel in said background  
 regions, and

63. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein

altering the pixel saturation values in said main subject regions according to said associated belief values.

computing a luminance value for each pixel, and  
altering the pixel luminance values according to said associated  
belief values.

65. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of altering the pixel luminance  
values in said main subject regions according to said associated belief values.

66. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of altering the pixel luminance  
values in said main subject regions according to said associated belief values.

67. The method of Claim 57 wherein said altering step comprises the steps of:

computing a hue value for each pixel, and  
altering the pixel hue values according to said associated belief values.

68. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein  
said altering step comprises the step of altering the pixel hue values in said main subject regions according to said associated belief values.

69. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein  
said altering step comprises the step of altering the pixel hue values in said main subject regions according to said associated belief values.

70. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein  
said altering step comprises the step of inverting the pixel hue values in said main subject regions.

71. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein  
said altering step comprises the step of inverting the pixel hue values in said background regions.

72. The method of Claim 20 wherein said altering step comprises the steps of:

computing a blur value for each pixel, and  
altering the pixel blur values according to said associated belief values.

73. The method of Claim 57 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering step comprises the steps of calculating a pixel blur value for each pixel, and altering the pixel blur values in said background regions according to said associated belief values.

74. A method of modifying an image having pixels, comprising the steps of:

automatically generating a main subject belief map containing values indicating the location of a plurality of regions in the image, said main subject belief map containing at least a first belief value associated with one of said plurality of regions, said belief values related to the probability that the associated region is a main subject of the image;

altering pixel values in said plurality of regions in relation to said associated belief value.

75. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering step comprises the step of desaturating the pixels in said background regions.

76. The method in Claim 75 wherein said desaturation step comprises the steps of:

- calculating the luminance values for the pixels in said background regions;
- replacing the color values of the pixels in said background regions with their respective luminance values.

77. The method of Claim 74 wherein said altering step comprises the steps of:

- computing a saturation value for each pixel, and
- altering the pixel saturation values according to said associated belief values.

78. The method of Claim 74 further comprising the steps of:

- determining a threshold belief value discriminating main subject regions and background regions, and wherein
- said altering step comprises the step of enhancing saturation of the pixels in said main subject regions.

79. The method of Claim 74 further comprising the steps of:

- determining a threshold belief value discriminating main subject regions and background regions, and wherein
- said altering step comprises the steps of:
- computing a saturation value for each pixel in said background regions, and
- altering the pixel saturation values in said background regions according to said associated belief values.

80. The method of Claim 74 further comprising the steps of:



determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering step comprises the steps of:

computing a saturation value for each pixel in said main subject regions, and

altering the pixel saturation values in said main subject regions according to said associated belief values.

81. The method of Claim 74 wherein said altering step comprises the steps of:

computing a luminance value for each pixel, and

altering the pixel luminance values according to said associated belief values.

82. The method of Claim 74 further comprising the steps of:

determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering step comprises the step of altering the pixel luminance values in said main subject regions according to said associated belief values.

83. The method of Claim 74 further comprising the steps of:

determining a threshold belief value discriminating main subject regions and background regions, and wherein

said altering step comprises the step of altering the pixel luminance values in said main subject regions according to said associated belief values.

84. The method of Claim 74 wherein said altering step comprises the steps of:

computing a hue value for each pixel, and

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85. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of altering the pixel hue values  
in said main subject regions according to said associated belief values.

86. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of altering the pixel hue values  
in said main subject regions according to said associated belief values.

87. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of inverting the pixel hue  
values in said main subject regions.

88. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the step of inverting the pixel hue  
values in said background regions.

89. The method of Claim 74 wherein said altering step comprises the steps of:

computing a blur value for each pixel, and

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90. The method of Claim 74 further comprising the steps of:  
determining a threshold belief value discriminating main subject  
regions and background regions, and wherein  
said altering step comprises the steps of calculating a pixel blur  
value for each pixel, and altering the pixel blur values in said background regions  
according to said associated belief values.